

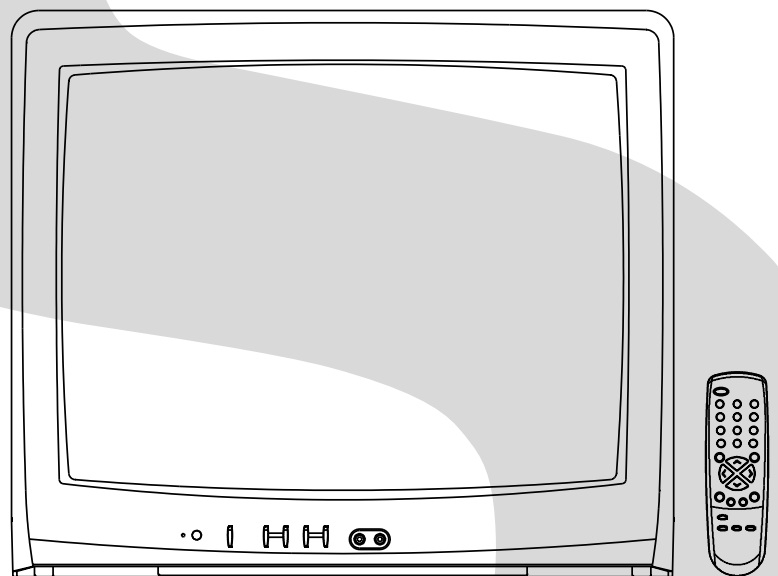
# TOSHIBA

FILE NO. 050-200117

## SERVICE MANUAL

## COLOR TELEVISION

# ***20AS21***



## SERVICING NOTICES ON CHECKING

### 1. KEEP THE NOTICES


As for the places which need special attentions, they are indicated with the labels or seals on the cabinet, chassis and parts. Make sure to keep the indications and notices in the operation manual.

### 2. AVOID AN ELECTRIC SHOCK

There is a high voltage part inside. Avoid an electric shock while the electric current is flowing.

### 3. USE THE DESIGNATED PARTS

The parts in this equipment have the specific characters of incombustibility and withstand voltage for safety. Therefore, the part which is replaced should be used the part which has the same character.

Especially as to the important parts for safety which is indicated in the circuit diagram or the table of parts as a  mark, the designated parts must be used.

### 4. PUT PARTS AND WIRES IN THE ORIGINAL POSITION AFTER ASSEMBLING OR WIRING

There are parts which use the insulation material such as a tube or tape for safety, or which are assembled in the condition that these do not contact with the printed board. The inside wiring is designed not to get closer to the pyrogenic parts and high voltage parts. Therefore, put these parts in the original positions.

### 5. TAKE CARE TO DEAL WITH THE CATHODE-RAY TUBE

In the condition that an explosion-proof cathode-ray tube is set in this equipment, safety is secured against implosion. However, when removing it or serving from backward, it is dangerous to give a shock. Take enough care to deal with it.

### 6. AVOID AN X-RAY

Safety is secured against an X-ray by considering about the cathode-ray tube and the high voltage peripheral circuit, etc.

Therefore, when repairing the high voltage peripheral circuit, use the designated parts and make sure not modify the circuit.

Repairing except indicates causes rising of high voltage, and it emits an X-ray from the cathode-ray tube.

### 7. PERFORM A SAFETY CHECK AFTER SERVICING

Confirm that the screws, parts and wiring which were removed in order to service are put in the original positions, or whether there are the portions which are deteriorated around the serviced places serviced or not. Check the insulation between the antenna terminal or external metal and the AC cord plug blades. And be sure the safety of that.

#### (INSULATION CHECK PROCEDURE)

1. Unplug the plug from the AC outlet.
2. Remove the antenna terminal on TV and turn on the TV.
3. Insulation resistance between the cord plug terminals and the external exposure metal **[Note 2]** should be more than 1M ohm by using the 500V insulation resistance meter **[Note 1]**.
4. If the insulation resistance is less than 1M ohm, the inspection repair should be required.

#### **[Note 1]**

If you have not the 500V insulation resistance meter, use a Tester.

#### **[Note 2]**

External exposure metal: Antenna terminal

## HOW TO ORDER PARTS

Please include the following informations when you order parts. (Particularly the VERSION LETTER.)

#### 1. MODEL NUMBER and VERSION LETTER

The MODEL NUMBER can be found on the back of each product and the VERSION LETTER can be found at the end of the SERIAL NUMBER.

#### 2. PART NO. and DESCRIPTION

You can find it in your SERVICE MANUAL.

## IMPORTANT

Inferior silicon grease can damage IC's and transistors.

When replacing an IC's or transistors, use only specified silicon grease (YG6260M).

Remove all old silicon before applying new silicon.

# GENERAL SPECIFICATIONS

G-1	TV System	CRT	CRT Size / Visual Size	19 inch / 480.0mmV
			CRT Type	Normal
			Deflection	90 degree
			Magnetic Field BV/BH	+0.35G/0.30G
		Color System		NTSC
		Speaker		1Speaker
			Position	Bottom
			Size	3 Inch
			Impedance	8 ohm
			Sound Output	MAX 1.5 W
		10%(Typical) 1.0 W		
		NTSC3.58+4.43 /PAL60Hz	No	
G-2	Tuning System	Broadcasting System		US System M
		Tuner and Receive CH	System	1Tuner
			Destination	Others
			Tuning System	F-Synth
			Input Impedance	VHF/UHF 75 ohm
			CH Coverage	2 - 69, 4A, A-5 - A-1, A - I, J - W, W+1 - W+84
		Intermediate Frequency	Picture(FP)	45.75MHz
			Sound(FS)	41.25MHz
			FP-FS	4.50MHz
			Preset CH	No
	Stereo/Dual TV Sound	No		
	Tuner Sound Muting	Yes		
G-3	Power	Power Source	AC DC	120V AC 60Hz
		Power Consumption		at AC
			Stand by (at AC) Per Year	73 W at AC 120 V 60 Hz 5 W at AC 120 V 60 Hz -- kWh/Year
		Protector	Power Fuse	Yes
G-4	Regulation	Safety		UL
		Radiation		FCC
		X-Radiation		DHHS
G-5	Temperature	Operation		+5oC ~ +40oC
		Storage		-20oC ~ +60oC
G-6	Operating Humidity			Less then 80% RH
G-7	On Screen Display	Menu		Yes
		Menu Type		Character
		Picture		Yes
			Contrast	Yes
			Brightness	Yes
			Color	Yes
			Tint	Yes
			Sharpness	Yes
		Audio		No
			Bass	No
			Treble	No
			Balance	No
			BBE On/Off	No
			Stable Sound On/Off	No
		CH Set Up		Yes
			TV/CABLE(CATV)	Yes
			Auto CH Memory	Yes
			Add/ Delete	Yes
		Language		Yes
		V-chip		Yes
			CH Label	No
			Favorite CH	No
			Color Stream DVD/DTV	No
		Control Level		Yes
			Volume	Yes
			Brightness	Yes
			Contrast	Yes
			Color	Yes
			Tint (NTSC Only)	Yes
			Sharpness	Yes
			Tuning	No
			Bass	No
			Treble	No
			Balance	No
			Back Light	No
			Stereo,Audio Output,SAP	No
			Video	Yes
			Color Stream	No
			Channel(TV/Cable)	Yes
			CH Label	No
	Sleep Timer	Yes		
	Sound Mute	Yes		
	V-chip Rating	Yes		

## GENERAL SPECIFICATIONS

<b>G-8</b>	<b>OSD Language</b>	OSD Language Setting		English	French	Spanish
<b>G-9</b>	<b>Clock and Timer</b>	Sleep Timer	Max Time Step	120 Min		
		On/Off Timer	Program(On Tim / Off Tim)	10 Min		
		Wake Up Timer		No		
		Timer Back-up (at Power Off Mode)	more than	--	Min	Sec
<b>G-10</b>	<b>Remote Control</b>	Unit		RC-EH		
		Glow in Dark Remocon			No	
		Format		Toshiba		
		Custom Code		40-BF h		
		Power Source	Voltage(D.C)	3V		
			UM size x pcs	UM-4 x 2 pcs		
		Total Keys		27 Keys		
		Keys	Power	Yes		
			1	Yes		
			2	Yes		
			3	Yes		
			4	Yes		
			5	Yes		
			6	Yes		
			7	Yes		
			8	Yes		
			9	Yes		
			0	Yes		
			100		No	
			CH Up	Yes		
			CH Down	Yes		
			Volume Up	Yes		
			Volume Down	Yes		
			TV/Caption/Text	Yes		
			CH1/CH2	Yes		
			TV/Video(TV/AV)	Yes		
			CH RTN/CH ENT(Quick View)	Yes		
			Sleep	Yes		
			RE Call(Call)	Yes		
			Reset	Yes		
			Menu	Yes		
			Enter	Yes		
			Mute	Yes		
			Exit		No	
			MTS(Audio Select)		No	
			Set +	Yes		
			Set -	Yes		
		Multi Brand Keys	CH Up(VCR)		No	
			CH Down(VCR)		No	
			Pause/Still		No	
			TV/VCR(VCR)		No	
			Code		No	
			FF		No	
			Rew		No	
			Rec		No	
			Play		No	
			Stop		No	
			TV		No	
			VCR		No	
			Cable		No	

## GENERAL SPECIFICATIONS

G-11	Features	Auto Degauss	Yes
		Auto Shut Off	Yes
		Canal+	No
		CATV	Yes
		Anti-theft	No
		Rental	No
		Memory(Last CH)	Yes
		Memory(Last Volume)	Yes
		V-Chip	Yes
		Type	USA,ORION Type
		BBE	No
		Auto Search	No
		CH Allocation	No
		SAP	No
		Channel Lock	No
		Just Clock Function	No
		Game Position	No
		CH Label	No
		VM Circuit	No
		Full OSD	No
		Premiere	No
		Comb Filter	No
			Lines
		Auto CH Memory	Yes
		Hotel Lock	No
		Closed Caption	Yes
		Stable Sound	No
		FBT Leak Test Protect	Yes
		Favorite CH	No
G-12	Accessories	Owner's Manual	Language
			W/ Warranty
		Remote Control Unit	English / Spanish
		Rod Antenna	Yes
			No
		Poles	
		Terminal	
		Loop Antenna	No
		Terminal	
		U/V Mixer	No
		DC Car Cord (Center+)	No
		Guarantee Card	No
		Warning Sheet	No
		Circuit Diagram	No
		Antenna Change Plug	No
		Service Facility List	No
		Important Safety Instruction	Yes
		Dew/AHC Caution Sheet	No
		AC Plug Adapter	No
		Quick Set-up Sheet	No
		Battery	Yes
		UM size x pcs	UM4 x 2
		OEM Brand	No
		AC Cord	No
		AV Cord (2Pin-1Pin)	No
		Registration Card (NDL Card)	No
		ESP Card	No
		PTB Sheet	No
		300 ohm to 75 ohm Antenna Adapter	No

## GENERAL SPECIFICATIONS

G-13	Interface	Switch	Front	Power	Yes	
				System Select	No	
				Main Power SW	No	
				Sub Power	No	
				Channel Up/Reset	Yes	
				Channel Down/Enter	Yes	
				Volume Up/Set Up	Yes	
				Volume Down/Set Down	Yes	
			Rear	MENU=Volume Up+Volume Down	Yes	
				AC/DC	No	
				TV/CATV Selector	No	
				Degauss	No	
				Main Power SW	No	
				Indicator	Power	Yes
					Stand-by	No
					On Timer	No
		Terminals	Front	Video Input	RCA RCA x 1	
				Audio Input		
				Other Terminal		
			Rear	Video Input(Rear1)	No	
				Video Input(Rear2)	No	
				Audio Input(Rear1)	No	
				Audio Input(Rear2)	No	
				Video Output	No	
				Audio Output	No	
				Euro Scart	No	
				Color Stream	No	
Diversity	No					
Ext Speaker	No					
DC Jack 12V(Center +)	No					
VHF/UHF Antenna Input	F Type					
AC Outlet	No					

G-14	Set Size	Approx.	W x D x H (mm)	488 x 465 x 416
G-15	Weight	Net (Approx.)		17.5kg ( 38.6 lbs)
		Gross (Approx.)		20.0kg ( 44.1lbs)
G-16	Carton	Master Carton		No
			Content	---- Sets
			Material	-- /--
			Dimensions W x D x H(mm)	-- x -- x --
			Description of Origin	No
		Gift Box		Yes
			Material	Double/Brown
			Dimensions W x D x H(mm)	546 x 526 x 472
			Design	As per Buyer's
			Description of Origin	Yes
		Drop Test		Natural Dropping At 1 Corner / 3 Edges / 6 Surfaces
			Height (cm)	46
			Container Stuffing	436

G-17	Cabinet Material	Cabinet Front	PS 94V0 DECABROM
		Cabinet Rear	PS 94V0 DECABROM

# DISASSEMBLY INSTRUCTIONS

## 1. REMOVAL OF ANODE CAP

Read the following **NOTED** items before starting work.

- \* After turning the power off there might still be a potential voltage that is very dangerous. When removing the Anode Cap, make sure to discharge the Anode Cap's potential voltage.
- \* Do not use pliers to loosen or tighten the Anode Cap terminal, this may cause the spring to be damaged.

### REMOVAL

1. Follow the steps as follows to discharge the Anode Cap.  
(Refer to Fig. 1-1.)

Connect one end of an Alligator Clip to the metal part of a flat-blade screwdriver and the other end to ground. While holding the plastic part of the insulated Screwdriver, touch the support of the Anode with the tip of the Screwdriver.

A cracking noise will be heard as the voltage is discharged.

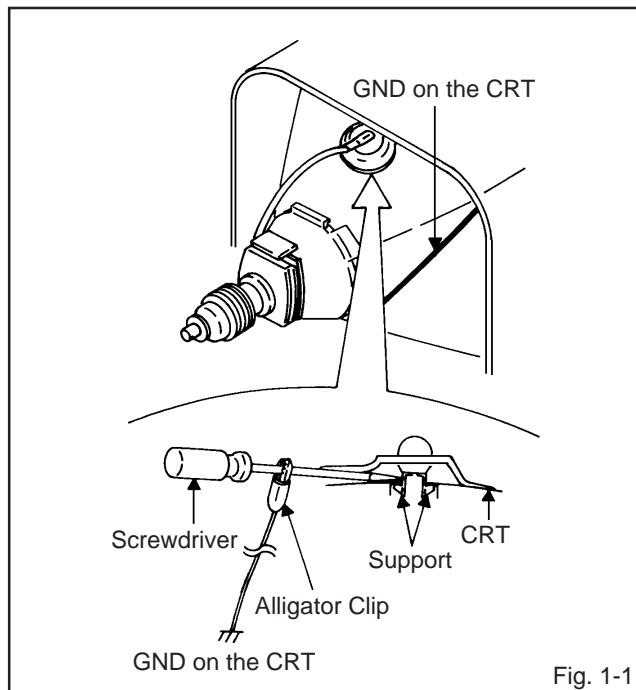


Fig. 1-1

2. Flip up the sides of the Rubber Cap in the direction of the arrow and remove one side of the support.  
(Refer to Fig. 1-2.)

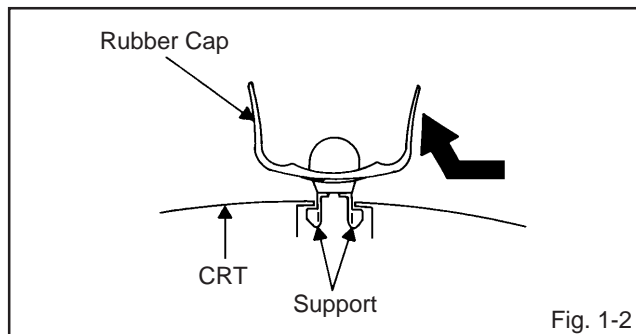


Fig. 1-2

3. After one side is removed, pull in the opposite direction to remove the other.

### NOTE

Take care not to damage the Rubber Cap.

### INSTALLATION

1. Clean the spot where the cap was located with a small amount of alcohol. (Refer to Fig. 1-3.)

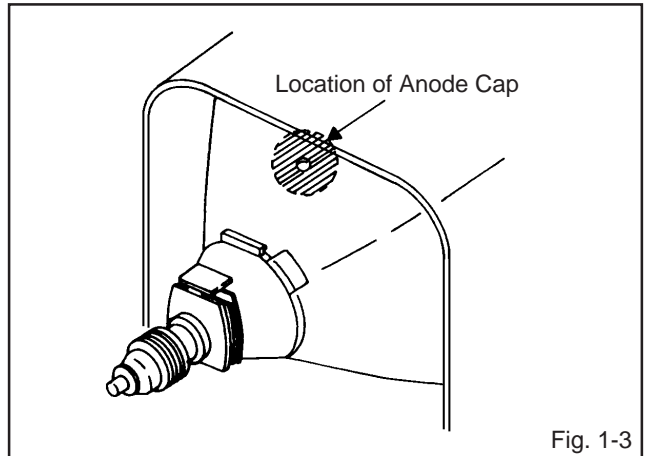


Fig. 1-3

### NOTE

Confirm that there is no dirt, dust, etc. at the spot where the cap was located.

2. Arrange the wire of the Anode Cap and make sure the wire is not twisted.
3. Turn over the Rubber Cap. (Refer to Fig. 1-4.)

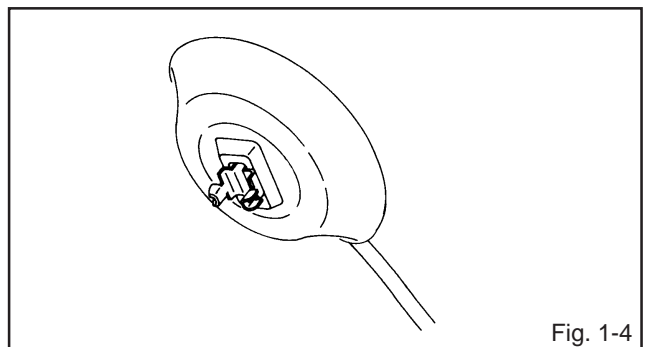


Fig. 1-4

4. Insert one end of the Anode Support into the anode button, then the other as shown in Fig. 1-5.

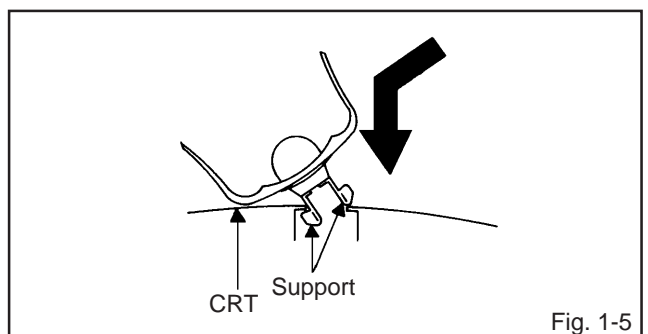


Fig. 1-5

5. Confirm that the Support is securely connected.
6. Put on the Rubber Cap without moving any parts.

## DISASSEMBLY INSTRUCTIONS

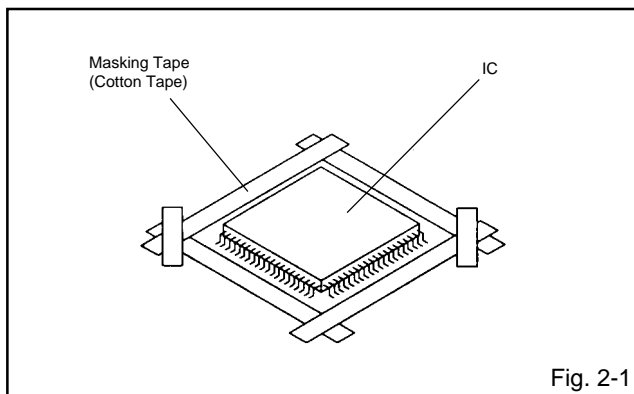
### 2. REMOVAL AND INSTALLATION OF FLAT PACKAGE IC

#### REMOVAL

1. Put the Masking Tape (cotton tape) around the Flat Package IC to protect other parts from any damage. **(Refer to Fig. 2-1.)**

#### NOTE

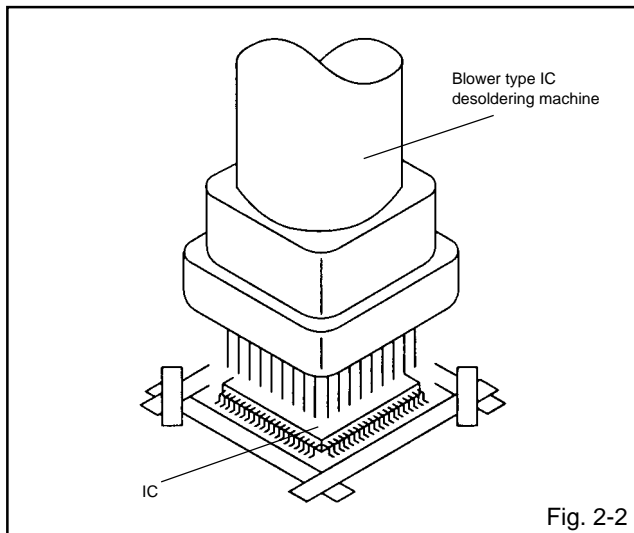
Masking is carried out on all the parts located within 10 mm distance from IC leads.



2. Heat the IC leads using a blower type IC desoldering machine. **(Refer to Fig. 2-2.)**

#### NOTE

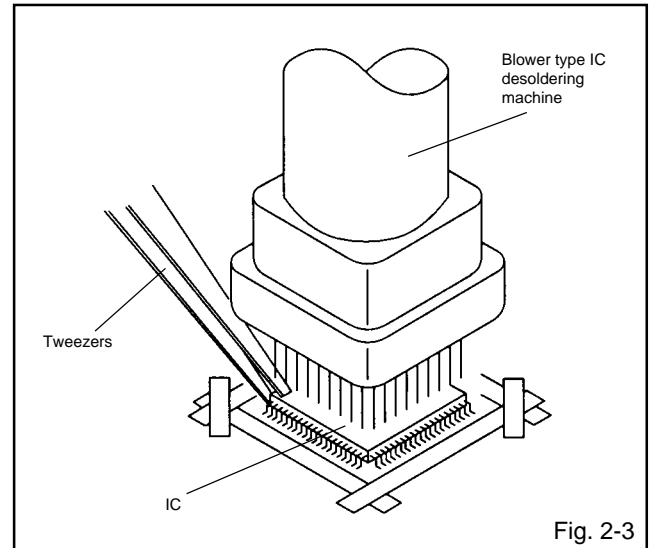
Do not add the rotating and the back and forth directions force on the IC, until IC can move back and forth easily after desoldering the IC leads completely.



3. When IC starts moving back and forth easily after desoldering completely, pickup the corner of the IC using a tweezers and remove the IC by moving with the IC desoldering machine. **(Refer to Fig. 2-3.)**

#### NOTE

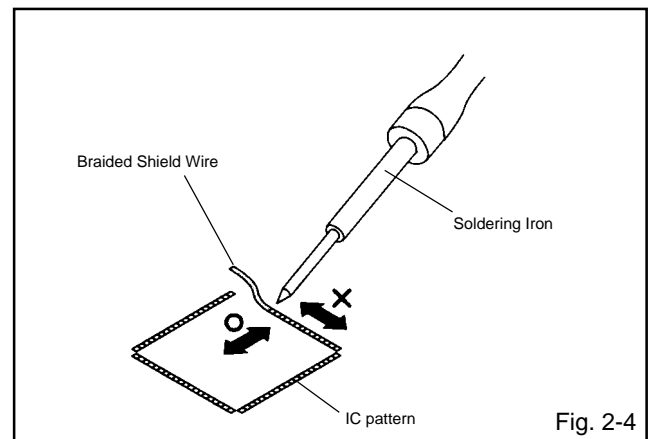
Some ICs on the PCB are affixed with glue, so be careful not to break or damage the foil of each IC leads or solder lands under the IC when removing it.



4. Peel off the Masking Tape.
5. Absorb the solder left on the pattern using the Braided Shield Wire. **(Refer to Fig. 2-4.)**

#### NOTE

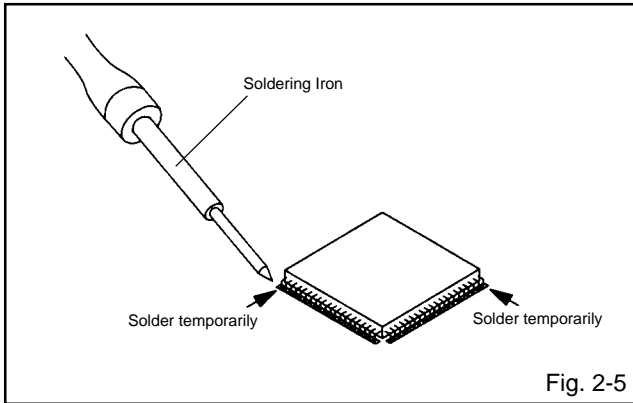
Do not move the Braided Shield Wire in the vertical direction towards the IC pattern.



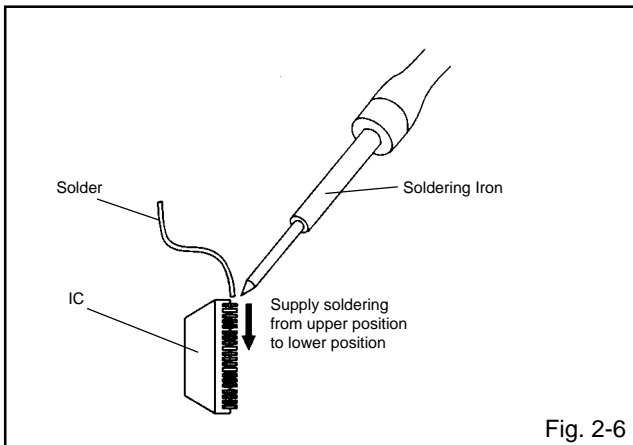
# DISASSEMBLY INSTRUCTIONS

## INSTALLATION

1. Take care of the polarity of new IC and then install the new IC fitting on the printed circuit pattern. Then solder each lead on the diagonal positions of IC temporarily. (Refer to Fig. 2-5.)



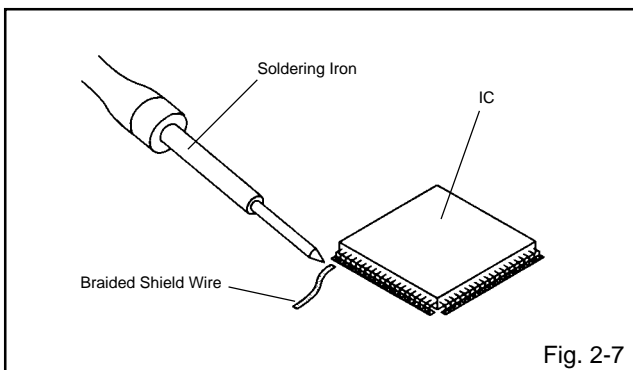
2. Supply the solder from the upper position of IC leads sliding to the lower position of the IC leads. (Refer to Fig. 2-6.)



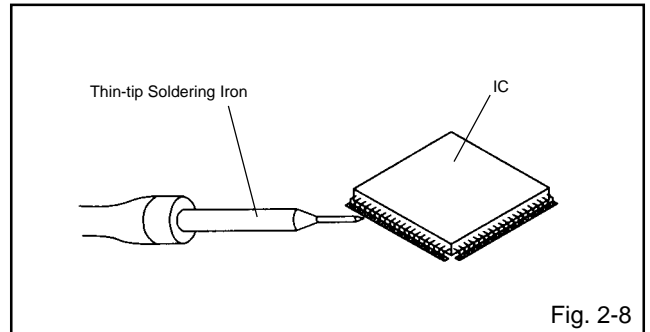
3. Absorb the solder left on the lead using the Braided Shield Wire. (Refer to Fig. 2-7.)

### NOTE

Do not absorb the solder to excess.



4. When bridge-soldering between terminals and/or the soldering amount are not enough, resolder using a Thin-tip Soldering Iron. (Refer to Fig. 2-8.)



5. Finally, confirm the soldering status on four sides of the IC using a magnifying glass. Confirm that no abnormality is found on the soldering position and installation position of the parts around the IC. If some abnormality is found, correct by resoldering.

### NOTE

When the IC leads are bent during soldering and/or repairing, do not repair the bending of leads. If the bending of leads are repaired, the pattern may be damaged. So, be always sure to replace the IC in this case.

## SERVICE MODE LIST

This unit provided with the following SERVICE MODES so you can repair, examine and adjust easily.  
To enter the Service Mode, press both set key and remote control key for more than 1 second.

Set Key	Remocon Key	Operations
VOL. (-) MIN	0	Releasing of V-CHIP PASSWORD.
VOL. (-) MIN	1	Initialization of the factory. NOTE: Do not use this for the normal servicing.
VOL. (-) MIN	6	POWER ON total hours is displayed on the screen. Refer to the "CONFIRMATION OF USING HOURS".  Can be checked of the INITIAL DATA of MEMORY IC. Refer to the "NOTE FOR THE REPLACING OF MEMORY IC".
VOL. (-) MIN	8	Writing of EEPROM initial data. NOTE: Do not use this for the normal servicing.
VOL. (-) MIN	9	Display of the Adjustment MENU on the screen. Refer to the "ELECTRICAL ADJUSTMENT" (On-Screen Display Adjustment).

## CONFIRMATION OF USING HOURS

POWER ON total hours can be checked on the screen. Total hours are displayed in 16 system of notation.

1. Set the VOLUME to minimum.
2. Press both VOL. DOWN button on the set and Channel button **(6)** on the remote control for more than 1 second.
3. After the confirmation of using hours, turn off the power.

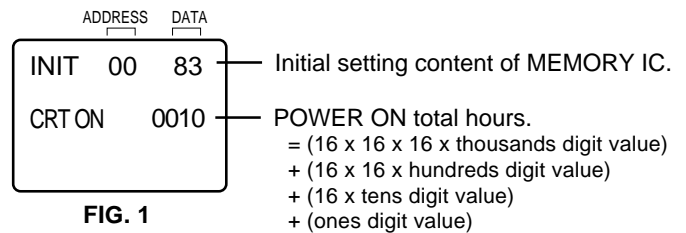


FIG. 1

## NOTE FOR THE REPLACING OF MEMORY IC

If a service repair is undertaken where it has been required to change the MEMORY IC, the following steps should be taken to ensure correct data settings while making reference to TABLE 1.

INI	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+A	+B
00	88	09	A2	01	06	63	24	09	29	20	FF	03

Table 1

1. Enter DATA SET mode by setting VOLUME to minimum.
2. Press both VOL. DOWN button on the set and Channel button **(6)** on the remote control for more than 1 second.  
ADDRESS and DATA should appear as FIG 1.
3. ADDRESS is now selected and should "blink". Using the SET + or - keys on the remote, step through the ADDRESS until required ADDRESS to be changed is reached.
4. Press ENTER to select DATA. When DATA is selected, it will "blink".
5. Again, step through the DATA using SET + or - until required DATA value has been selected.
6. Pressing ENTER will take you back to ADDRESS for further selection if necessary.
7. Repeat steps 3 to 6 until all data has been checked.
8. When satisfied correct DATA has been entered, turn POWER off (return to STANDBY MODE) to finish DATA input.  
The unit will now have the correct DATA for the new MEMORY IC.

# ELECTRICAL ADJUSTMENTS

## 1. BEFORE MAKING ELECTRICAL ADJUSTMENTS

Read and perform these adjustments when repairing the circuits or replacing electrical parts or PCB assemblies.

### CAUTION

- Use an isolation transformer when performing any service on this chassis.
- Before removing the anode cap, discharge electricity because it contains high voltage.
- When removing a PCB or related component, after unfastening or changing a wire, be sure to put the wire back in its original position.  
Inferior silicon grease can damage IC's and transistors.
- When replacing IC's and transistors, use only specified silicon grease.  
Remove all old silicon before applying new silicon.

**Prepare the following measurement tools for electrical adjustments.**

1. Oscilloscope
2. Digital Voltmeter

### On-Screen Display Adjustment

1. In the condition of NO indication on the screen.  
Press the VOL. DOWN button on the set and the Channel button **(9)** on the remote control for more than 1 second to appear the adjustment mode on the screen as shown in **Fig. 1-1**.

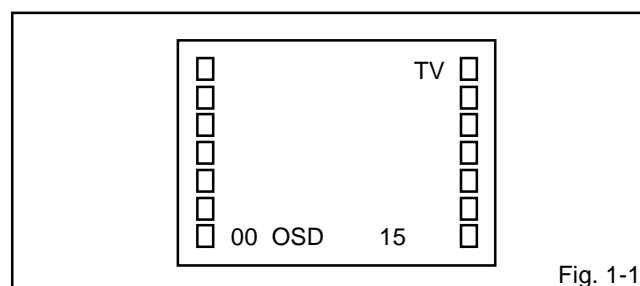


Fig. 1-1

2. Use the Channel UP/DOWN button or Channel button **(1-10)** on the remote control to select the options shown in **Fig. 1-2**.
3. Press the MENU button on the remote control to end the adjustments.

NO.	FUNCTION	NO.	FUNCTION
00	OSD H	13	BRIGHTNESS
01	CUT OFF	14	CONTRAST
02	RF AGC DELAY	15	COLOR
03	VIF VCO	16	TINT
04	H VCO	17	SHARPNESS
05	H PHASE	18	FM LEVEL
06	V SIZE	19	LEVEL
07	V SHIFT	20	SEPARATION 1
08	R DRIVE	21	SEPARATION 2
09	B DRIVE	22	TEST MONO
10	R BIAS	23	TEST STEREO
11	G BIAS	24	X-RAY TEST
12	B BIAS		

Fig. 1-2

## 2. BASIC ADJUSTMENTS

### 2-1: RF AGC DELAY

1. Place the set with Aging Test for more than 15 minutes.
2. Receive a 63dB monoscope pattern.
3. Connect the digital voltmeter to **R606**.
4. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(02)** on the remote control to select "RF AGC DELAY".
5. Press the VOL. UP/DOWN button on the remote control until the digital voltmeter is  $2.9 \pm 0.1V$ .

### 2-2: CUT OFF

1. Adjust the unit to the following settings.  
R.DRIVE=10, B.DRIVE=10, R.BIAS=64, G.BIAS=64, B.BIAS=64, BRIGHTNESS=130, CONTRAST=100.
2. Place the set with Aging Test for more than 15 minutes.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(01)** on the remote control to select "CUT OFF".
4. Adjust the **Screen Volume** until a dim raster is obtained.

### 2-3: FOCUS

1. Receive the monoscope pattern.
2. Turn the Focus Volume fully counterclockwise once.
3. Adjust the **Focus Volume** until picture is distinct.

### 2-4: WHITE BALANCE

**NOTE:** Adjust after performing CUT OFF adjustment.

1. Place the set with Aging Test for more than 10 minutes.
2. Receive the white 100% signal from the Pattern Generator.
3. Using the adjustment control, set the brightness and contrast to normal position.
4. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(10)** on the remote control to select "R.BIAS".
5. Using the VOL. UP/DOWN button on the remote control, adjust the R.BIAS.
6. Press the CH. UP/DOWN button on the remote control to select the "R.DRIVE", "B.DRIVE", "G.BIAS" or "B.BIAS".
7. Using the VOL. UP/DOWN button on the remote control, adjust the R.DRIVE, B.DRIVE, G.BIAS or B.BIAS.
8. Perform the above adjustments 6 and 7 until the white color is looked like a white.

### 2-5: SUB TINT/SUB COLOR

1. Receive the color bar pattern. (RF Input)
2. Connect the oscilloscope to **TP023**.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(16)** on the remote control to select "TINT".
4. Press the VOL. UP/DOWN button on the remote control until the section "A" becomes a straight line (**Refer Fig. 2-1**).
5. Connect the oscilloscope to **TP022**.
6. Press the CH DOWN button once to set to "COLOR" mode.
7. Press the VOL. UP/DOWN button on the remote control until the red color level is adjusted to 120% of the white level. (**Refer to Fig. 2-2**)
8. Receive the color bar pattern. (Audio Video Input)
9. Press the TV/AV button on the remote control to set to the AV mode. Then perform the above adjustments 2~7.

## ELECTRICAL ADJUSTMENTS

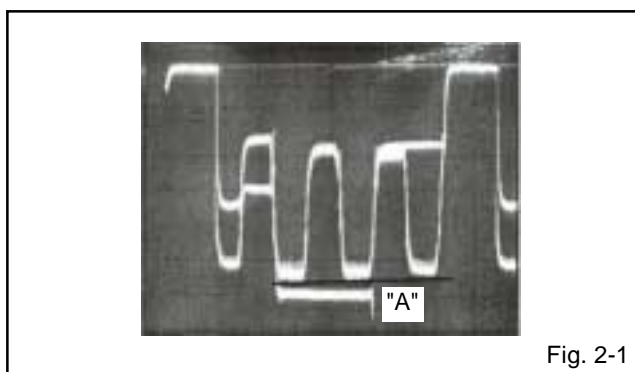


Fig. 2-1

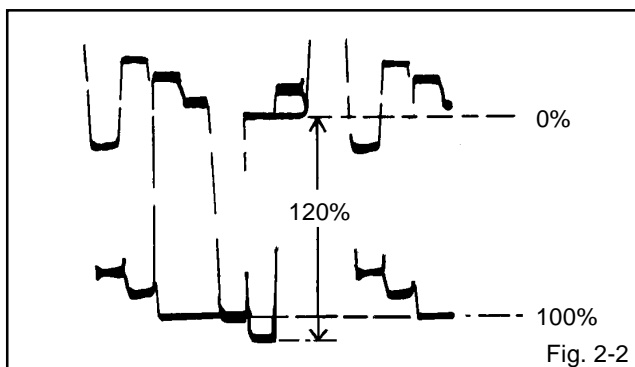


Fig. 2-2

### 2-6: HORIZONTAL PHASE

1. Receive the center cross signal from the Pattern Generator.
2. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(05)** on the remote control to select "H PHASE".
3. Press the VOL. UP/DOWN button on the remote control until the SHIFT quantity of the OVER SCAN on right and left becomes minimum.

### 2-7: VERTICAL SIZE

**NOTE:** Adjust after performing adjustments in section 2-6.

1. Receive the crosshatch signal from the Pattern Generator.
2. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(06)** on the remote control to select "V SIZE".
3. Press the VOL. UP/DOWN button on the remote control until the rectangle on the center of the screen becomes square.
4. Receive a broadcast and check if the picture is normal.

### 2-8: VERTICAL SHIFT

**NOTE:** Adjust after performing adjustments in section 2-7.

1. Receive the crosshatch signal from the Pattern Generator.
2. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(07)** on the remote control to select "V SHIFT".
3. Press the VOL. UP/DOWN button on the remote control until the horizontal line becomes fit to the notch of the shadow mask.

### 2-9: OSD HORIZONTAL

1. Activate the adjustment mode display of **Fig. 1-1**.
2. Press the VOL. UP/DOWN button on the remote control until the difference of A and B becomes minimum. (**Refer to Fig. 2-3**)

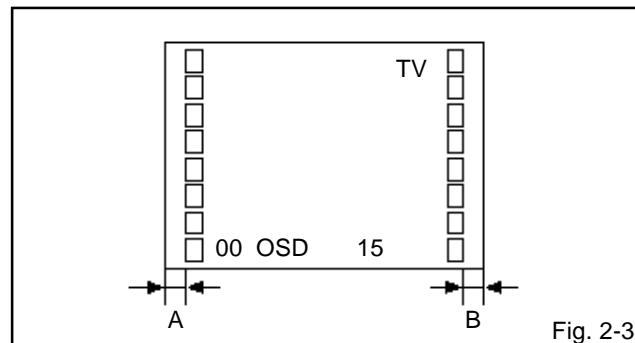


Fig. 2-3

### 2-10: VIF VCO

1. Place the set with Aging Test for more than 10 minutes.
2. Receive an 80dB monoscope pattern.
3. Connect the digital voltmeter between the **pin 5 of CP601** and the **GND**.
4. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(03)** on the remote control to select "VIF VCO".
5. Press the VOL. UP/DOWN button on the remote control until the digital voltmeter is 2.5V.

### 2-11: SUB CONTRAST MANUAL

1. Receive a 70dB the color bar pattern. (RF Input)
2. Activate the adjustment mode display of **Fig. 1-1** press the channel button **(14)** on the remote control to select "CONTRAST".
3. Press the VOL. UP/DOWN button on the remote control until the contrast step No. becomes "100".
4. Receive a 70db the color bar pattern. (Audio Video Input)
5. Press the TV/VIDEO button on the remote control to set to the AV mode. Then perform the above adjustments 2~3.

### 2-12: BRIGHTNESS

1. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(13)** on the remote control to select "BRIGHTNESS".
2. Press the VOL. UP/DOWN button on the remote control until the brightness step No. becomes "136".
3. Press the TV/VIDEO button on the remote control to set to the AV mode. Then perform the above adjustments 1~2.

# ELECTRICAL ADJUSTMENTS

## 3. PURITY AND CONVERGENCE ADJUSTMENTS

### NOTE

1. Turn the unit on and let it warm up for at least 30 minutes before performing the following adjustments.
2. Place the CRT surface facing east or west to reduce the terrestrial magnetism.
3. Turn ON the unit and demagnetize with a Degauss Coil.

### 3-1: STATIC CONVERGENCE (ROUGH ADJUSTMENT)

1. Tighten the screw for the magnet. Refer to the adjusted CRT for the position. **(Refer to Fig. 3-1)**  
If the deflection yoke and magnet are in one body, untighten the screw for the body.
2. Receive the green raster pattern from the color bar generator.
3. Slide the deflection yoke until it touches the funnel side of the CRT.
4. Adjust center of screen to green, with red and blue on the sides, using the pair of purity magnets.
5. Switch the color bar generator from the green raster pattern to the crosshatch pattern.
6. Combine red and blue of the 3 color crosshatch pattern on the center of the screen by adjusting the pair of 4 pole magnets.
7. Combine red/blue (magenta) and green by adjusting the pair of 6 pole magnets.
8. Adjust the crosshatch pattern to change to white by repeating steps 6 and 7.

### 3-2: PURITY

### NOTE

Adjust after performing adjustments in section 3-1.

1. Receive the green raster pattern from color bar generator.
2. Adjust the pair of purity magnets to center the color on the screen.  
Adjust the pair of purity magnets so the color at the ends are equally wide.
3. Move the deflection yoke backward (to neck side) slowly, and stop it at the position when the whole screen is green.
4. Confirm red and blue colors.
5. Adjust the slant of the deflection yoke while watching the screen, then tighten the fixing screw.

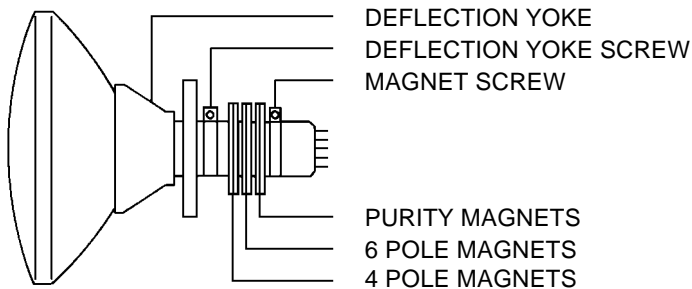


Fig. 3-1

### 3-3: STATIC CONVERGENCE

### NOTE

Adjust after performing adjustments in section 3-2.

1. Receive the crosshatch pattern from the color bar generator.
2. Combine red and blue of the 3 color crosshatch pattern on the center of the screen by adjusting the pair of 4 pole magnets.
3. Combine red/blue (magenta) and green by adjusting the pair of 6 pole magnets.

### 3-4: DYNAMIC CONVERGENCE

### NOTE

Adjust after performing adjustments in section 3-3.

1. Adjust the differences around the screen by moving the deflection yoke upward/downward and right/left. (Refer to Fig. 3-2-a)
2. Insert three wedges between the deflection yoke and CRT funnel to fix the deflection yoke. (Refer to Fig. 3-2-b)

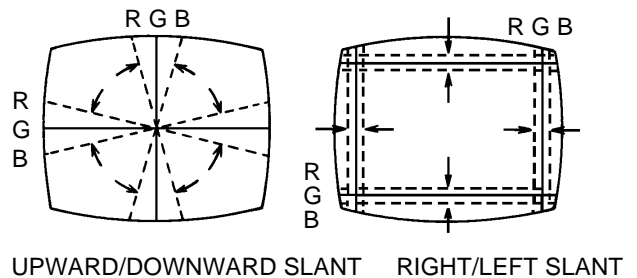


Fig. 3-2-a

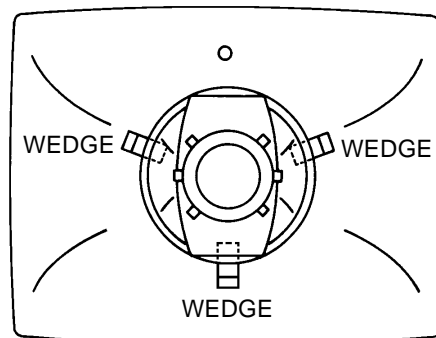
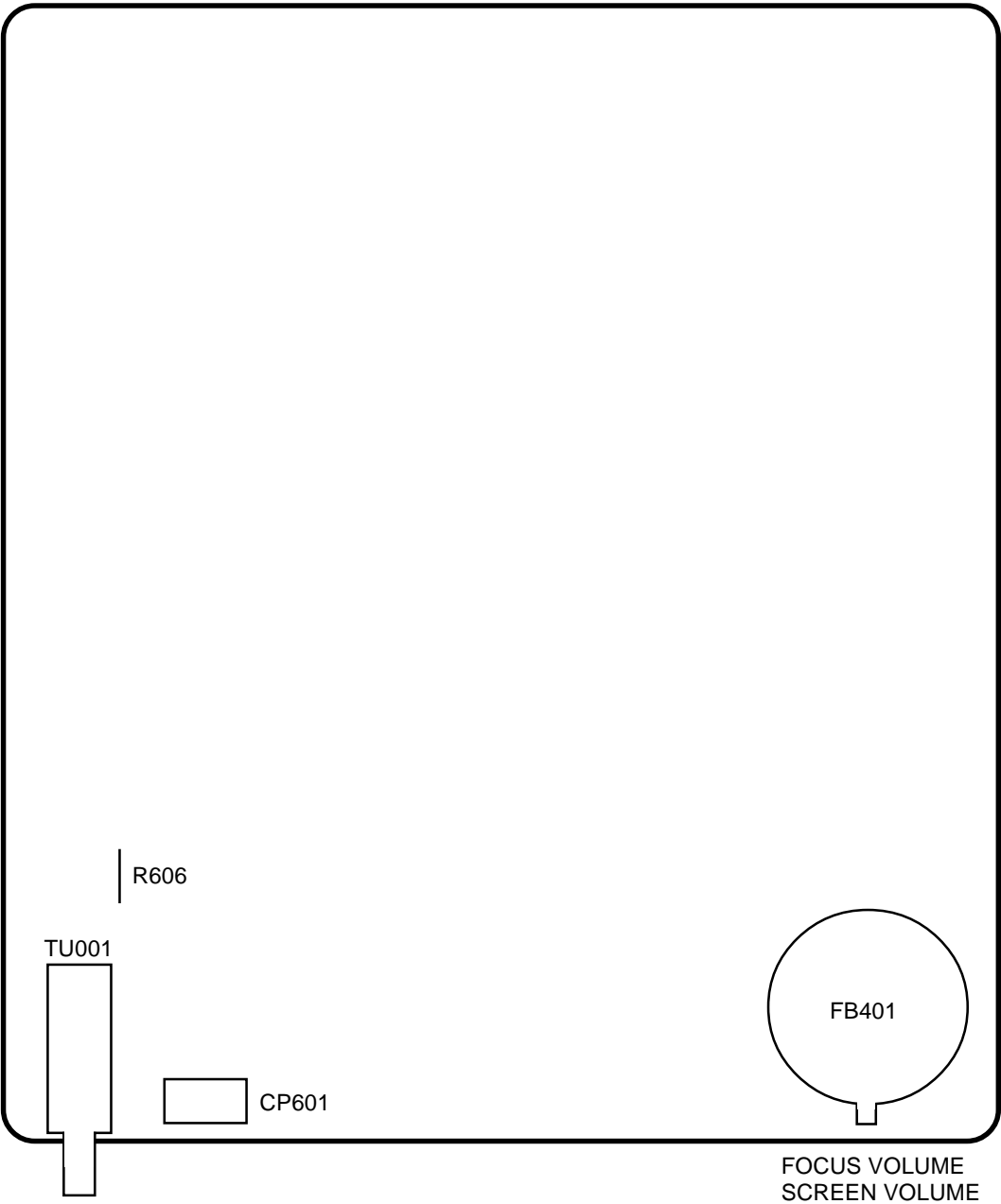
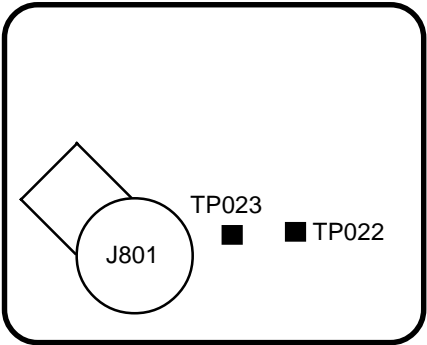


Fig. 3-2-b

MAJOR COMPONENTS LOCATION GUIDE

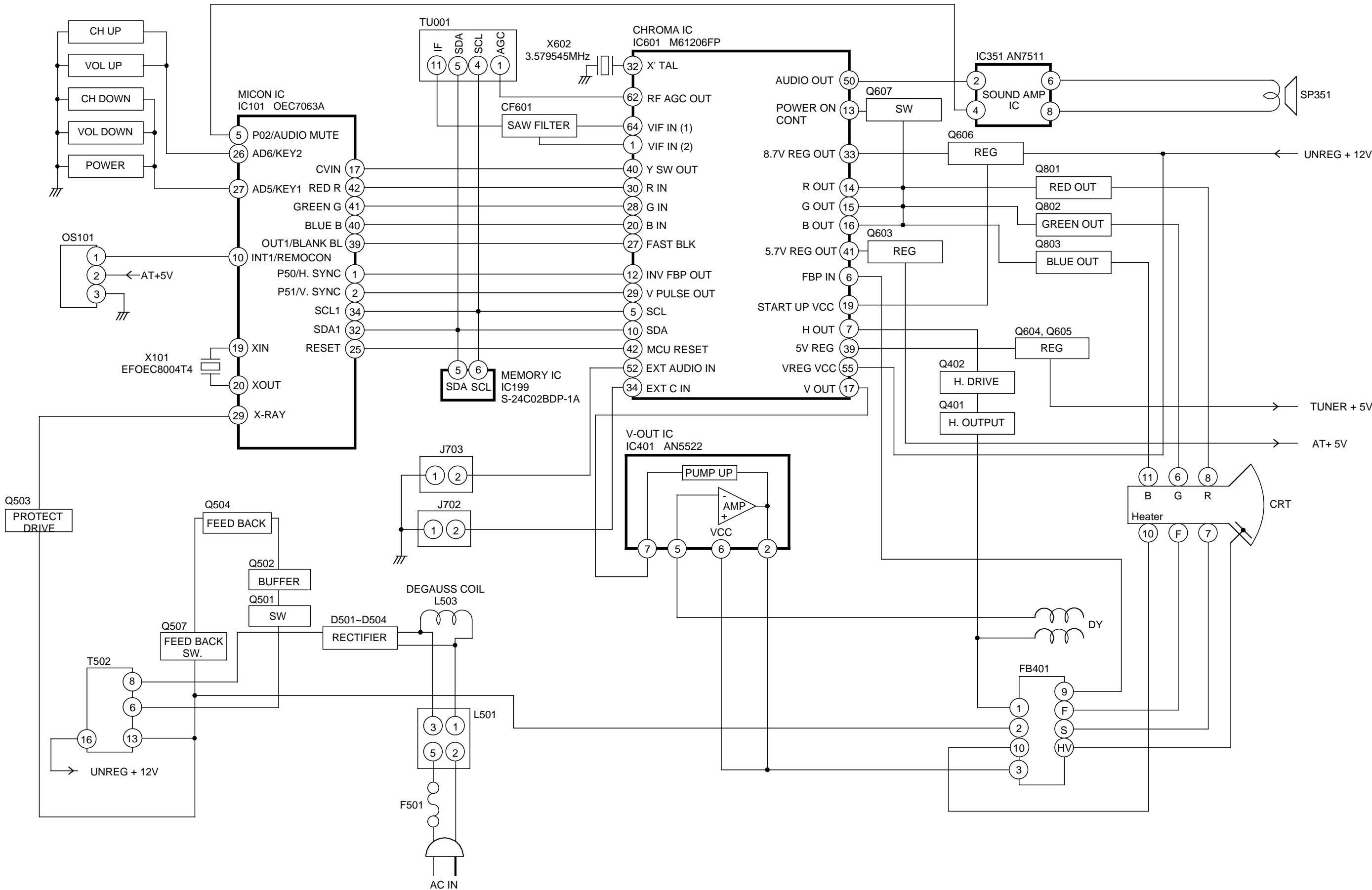


MAIN PCB

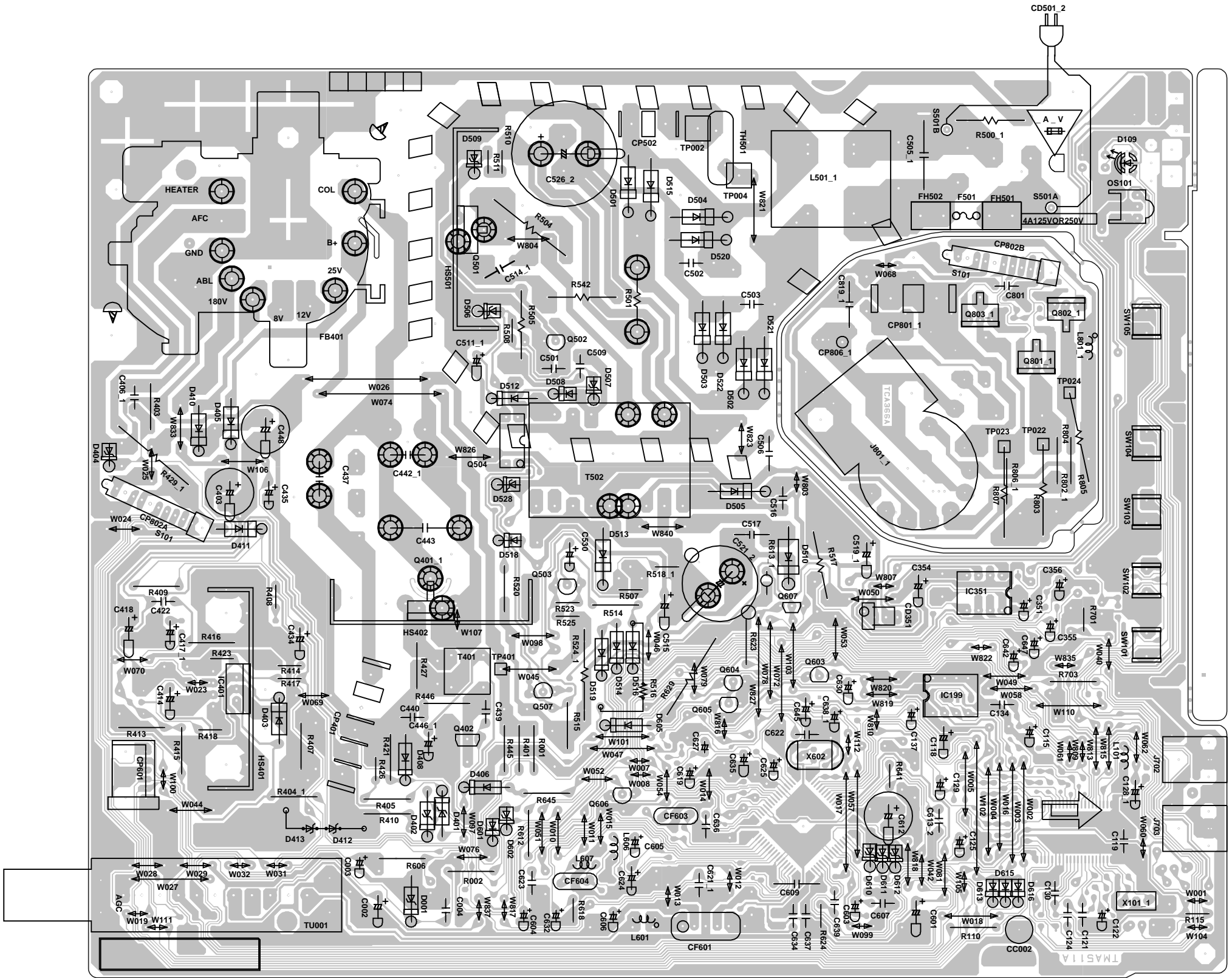


CRT PCB

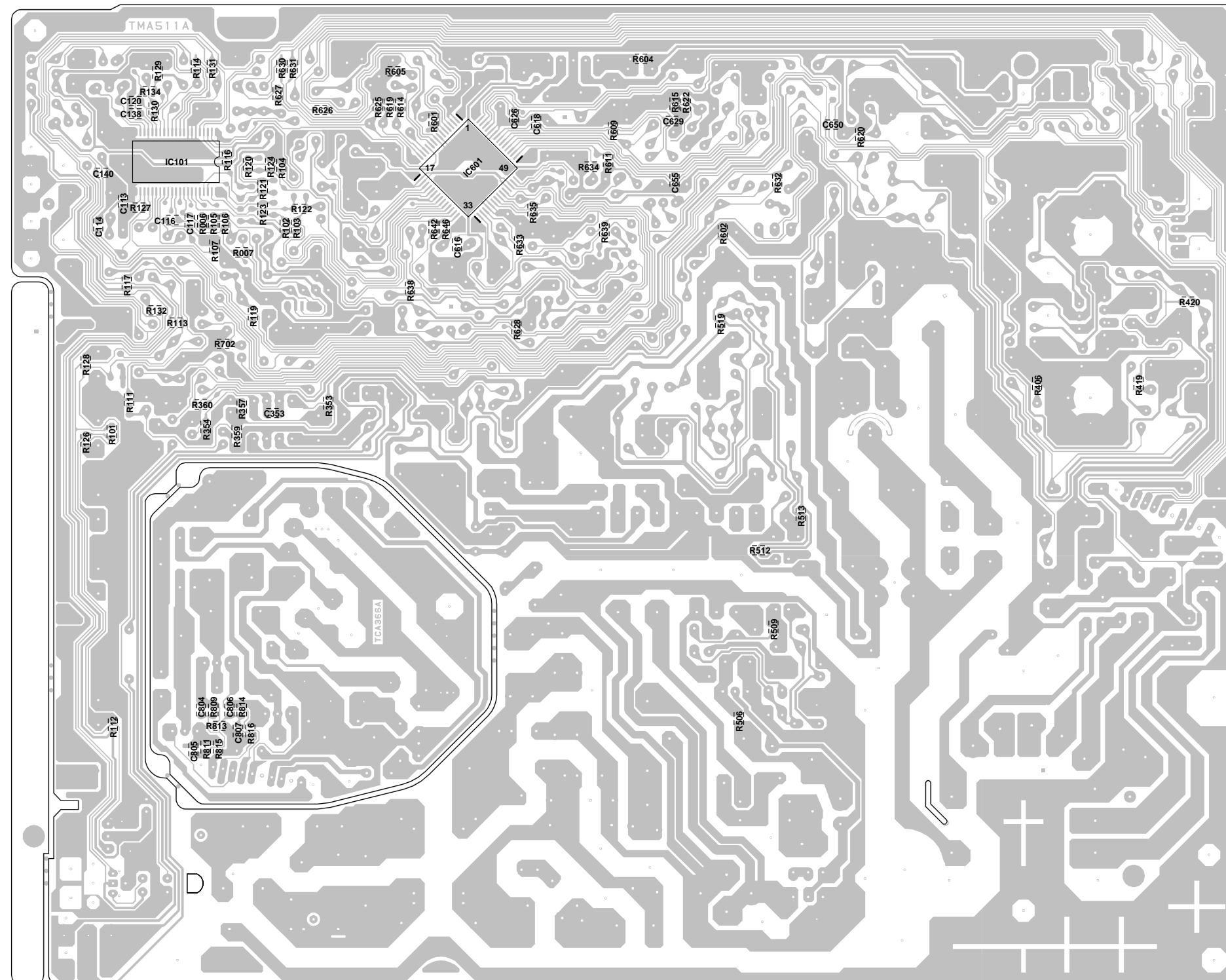
BLOCK DIAGRAM



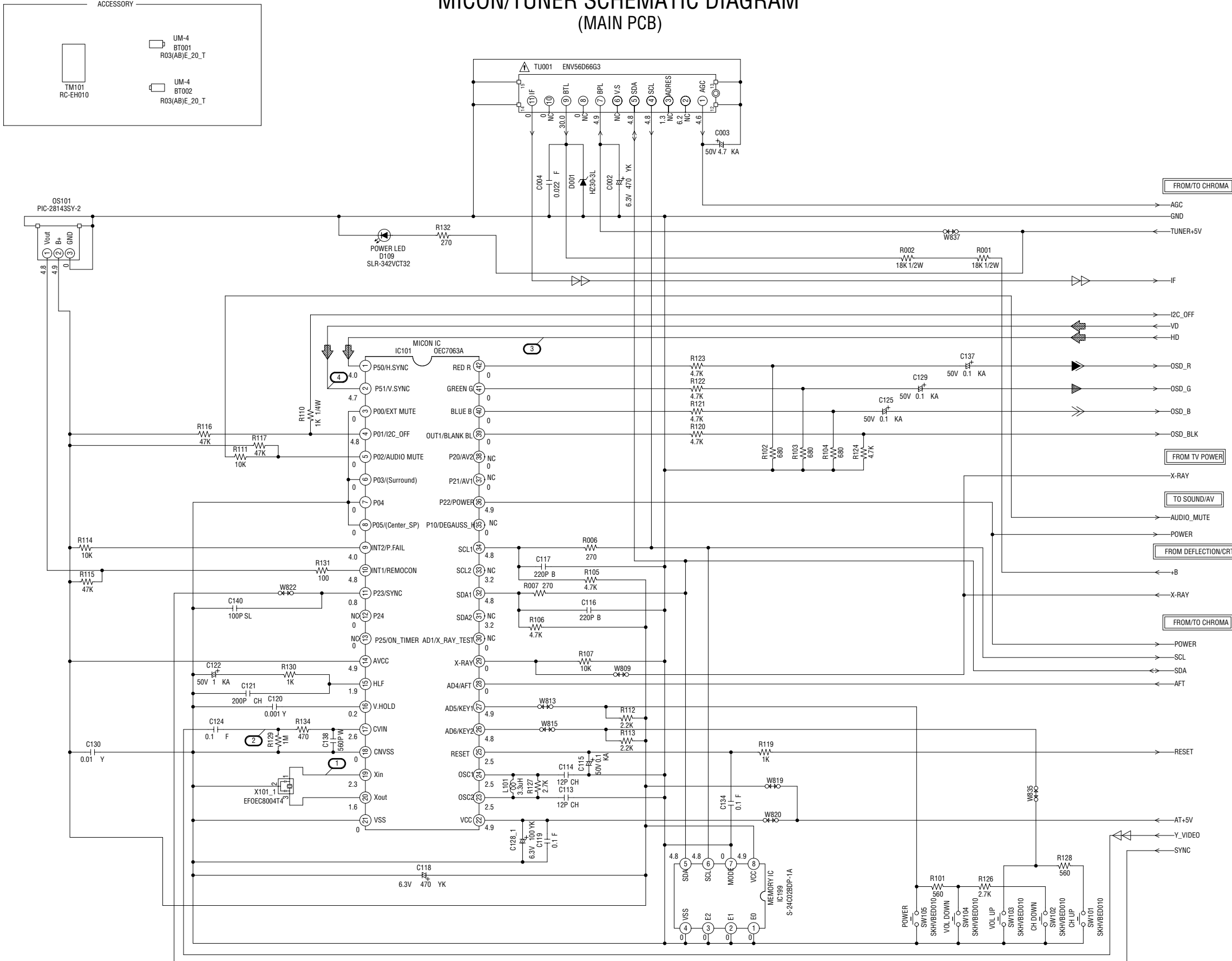
PRINTED CIRCUIT BOARDS  
MAIN/CRT (INSERTED PARTS)  
SOLDER SIDE



PRINTED CIRCUIT BOARDS  
MAIN/CRT (CHIP MOUNTED PARTS)  
SOLDER SIDE





## MICON/TUNER SCHEMATIC DIAGRAM (MAIN PCB)



NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

NOTE: THE DC VOLTAGE AT EACH PART WAS MEASURED WITH THE DIGITAL TESTER WHEN THE COLOR BROADCAST WAS RECEIVED IN GOOD CONDITION AND PICTURE IS NORMAL.

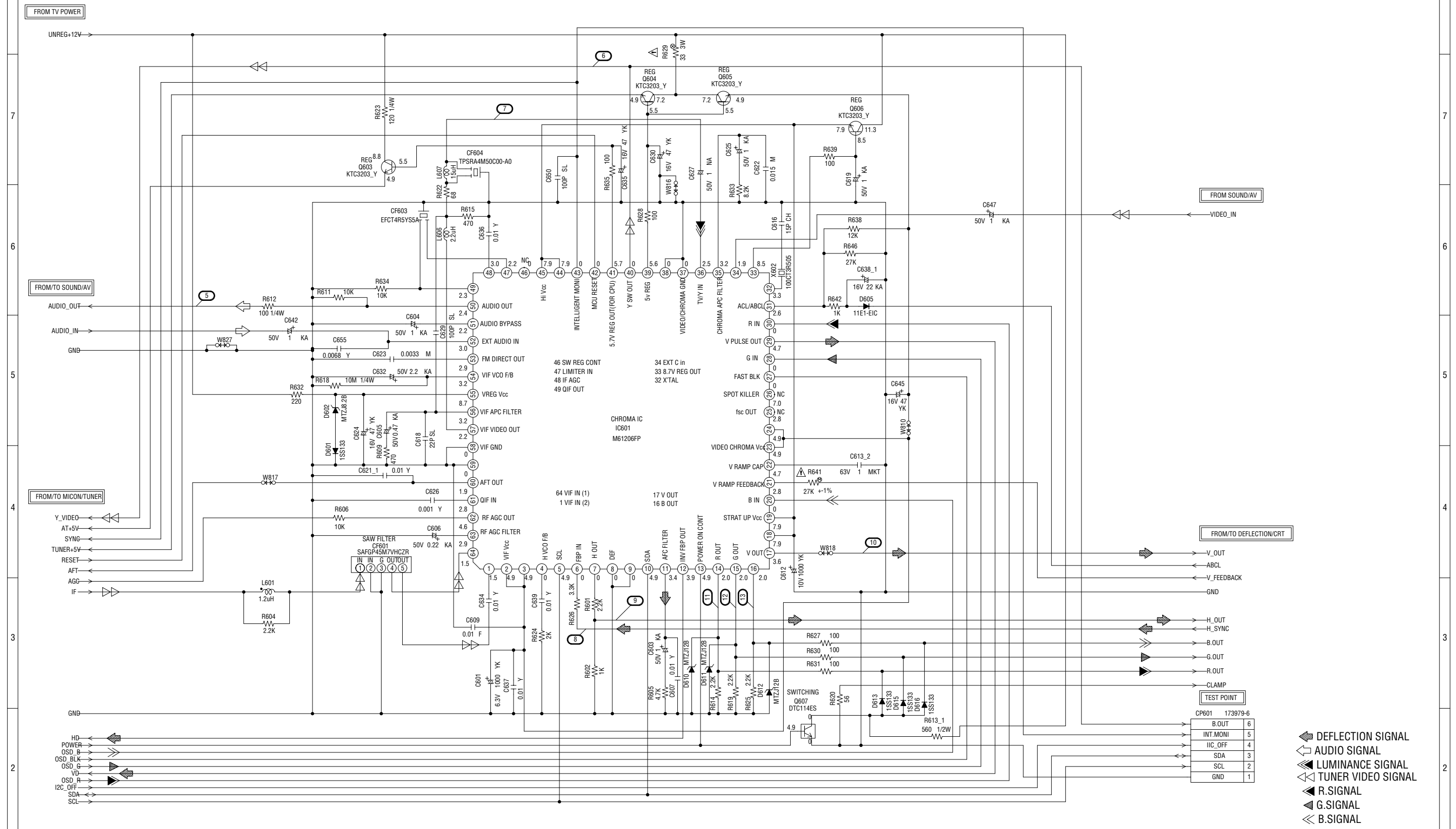
**CAUTION:** SINCE THESE PARTS MARKED BY  ARE CRITICAL FOR SAFETY, USE ONES DESCRIBED IN PARTS LIST ONLY .

**ATTENTION:** LES PIÈCES RÉPARÉES PAR UN  ÉTANT DANGEREUSES AU POINT DE VUE SÉCURITÉ, N'UTILISER QUE CELLES DÉCRITES DANS LA NOMENCLATURE DES PIÈCES.

- ◀ DEFLECTION SIGNAL
- ◀ TUNER VIDEO SIGNAL
- ◀ R.SIGNAL
- ◀ G.SIGNAL
- ◀ B.SIGNAL

PCB010  
TMA511

# CHROMA SCHEMATIC DIAGRAM (MAIN PCB)



- DEFLECTION SIGNAL
- AUDIO SIGNAL
- LUMINANCE SIGNAL
- TUNER VIDEO SIGNAL
- R.SIGNAL
- G.SIGNAL
- B.SIGNAL

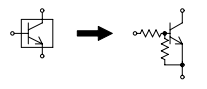
NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

NOTE: THE DC VOLTAGE AT EACH PART WAS MEASURED WITH THE DIGITAL TESTER WHEN THE COLOR BROADCAST WAS RECEIVED IN GOOD CONDITION AND PICTURE IS NORMAL.

CAUTION: SINCE THESE PARTS MARKED BY ARE CRITICAL FOR SAFETY, USE ONES DESCRIBED IN PARTS LIST ONLY.

ATTENTION: LES PIECES REPARÉES PAR UN ÉTANT DANGEREUSES AU POINT DE VUE SÉCURITÉ, N'UTILISER QUE CELLES DÉCRITES DANS LA NOMENCLATURE DES PIÈCES.

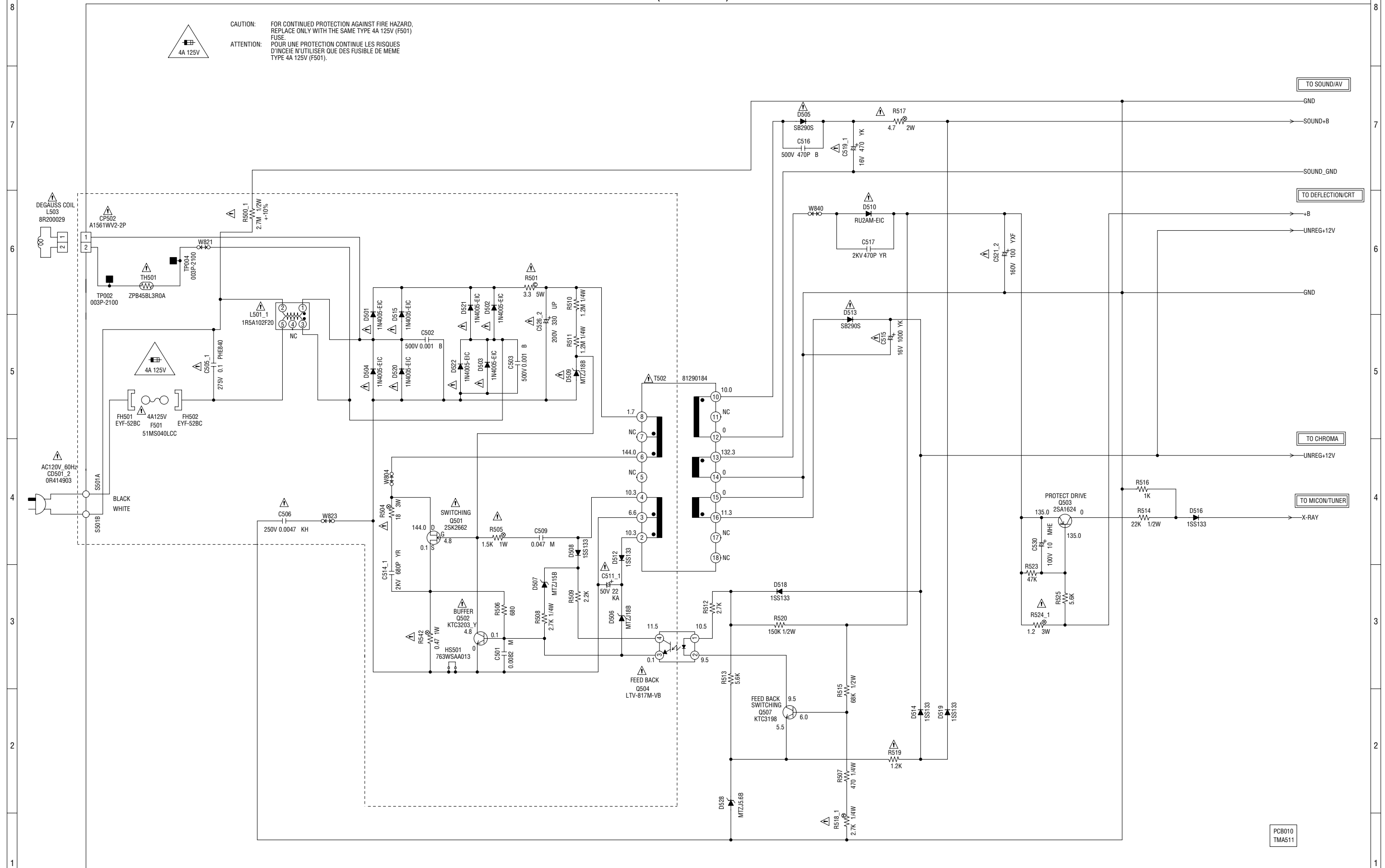
CAUTION: DIGITAL TRANSISTOR



PCB010  
TMA511

# TV POWER SCHEMATIC DIAGRAM


## (MAIN PCB)



NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

NOTE: THE DC VOLTAGE AT EACH PART WAS MEASURED WITH THE DIGITAL TESTER WHEN THE COLOR BROADCAST WAS RECEIVED IN GOOD CONDITION AND PICTURE IS NORMAL.

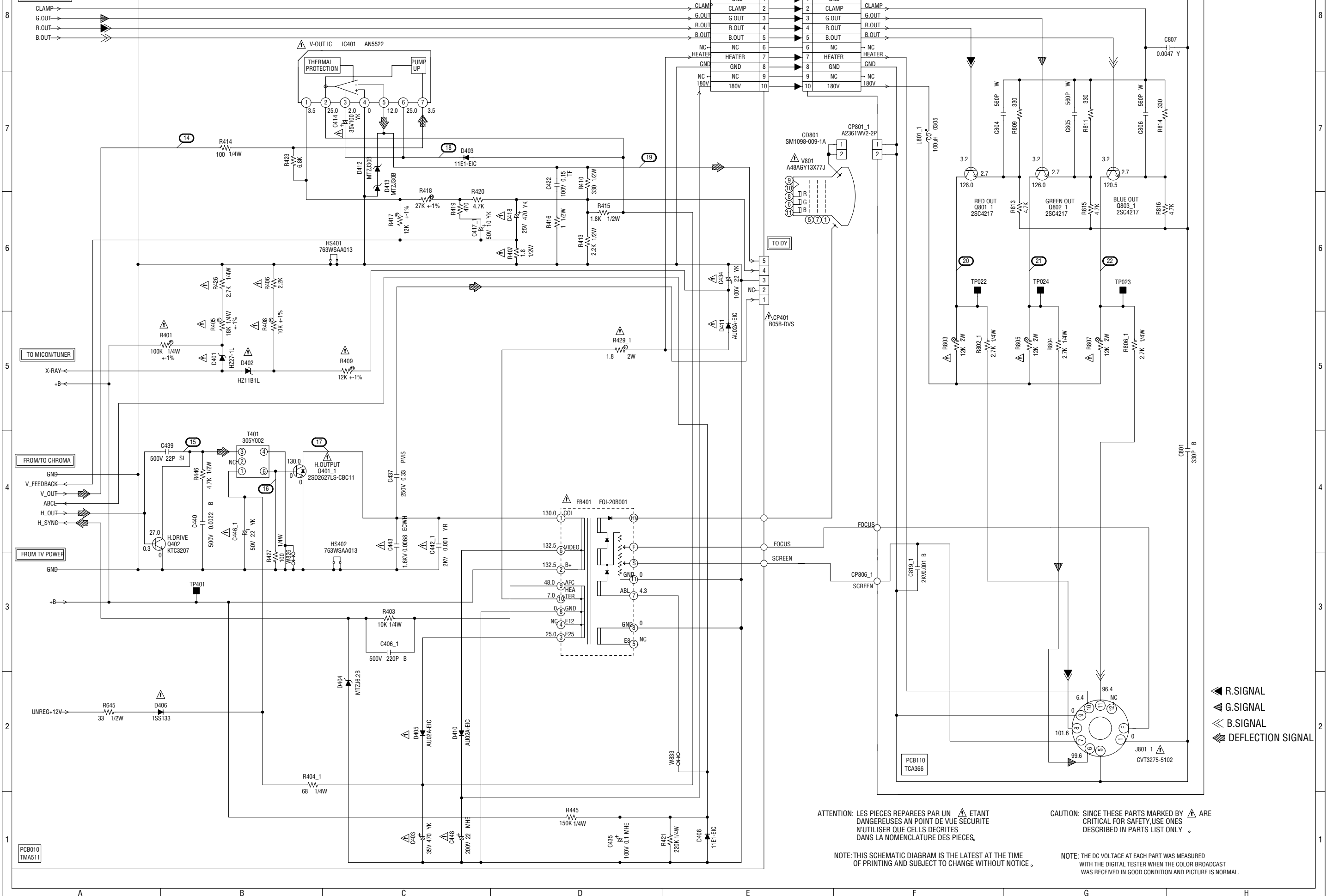
CAUTION: SINCE THESE PARTS MARKED BY  ARE CRITICAL FOR SAFETY, USE ONES DESCRIBED IN PARTS LIST ONLY .

ATTENTION: LES PIÈCES RÉPARÉES PAR UN  ÉTANT DANGEREUSES AU POINT DE VUE SÉCURITÉ N'UTILISER QUE CELLES DÉCRITES DANS LA NOMENCLATURE DES PIÈCES.

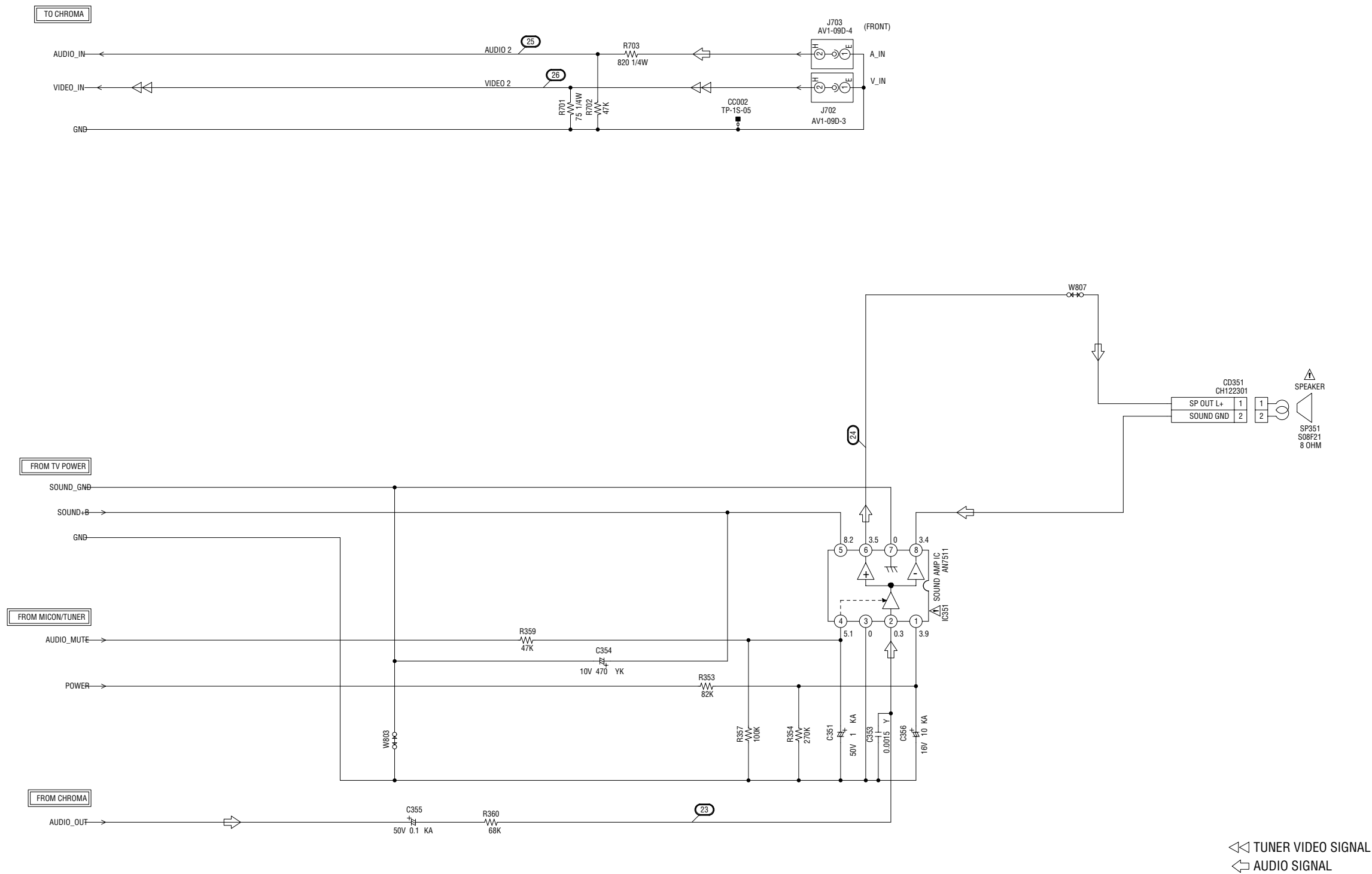
PCB010  
TMA511

# DEFLECTION/CRT SCHEMATIC DIAGRAM (MAIN PCB)

# (CRT PCB)

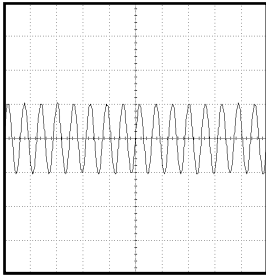


SOUND/AV SCHEMATIC DIAGRAM  
(MAIN PCB)

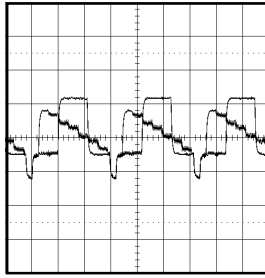


## WAVEFORMS

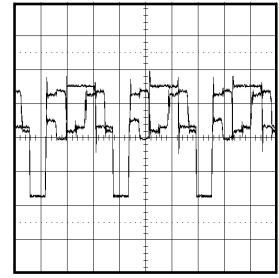
### MICON/TUNER



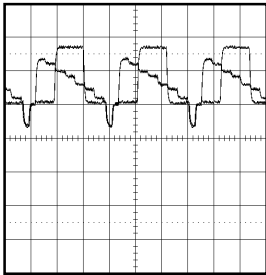
① 200mV 200ms/div



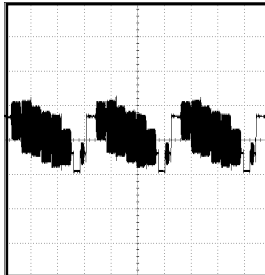
⑥ 0.5V 20μs/div



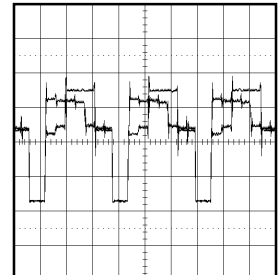
⑪ 1V 20μs/div



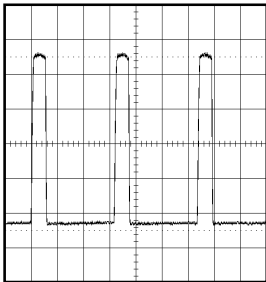
② 0.5V 20μs/div



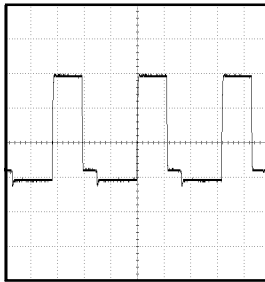
⑦ 500mV 20μs/div



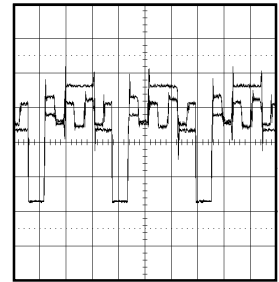
⑫ 1V 20μs/div



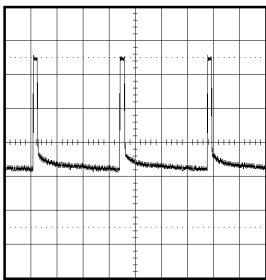
③ 200mV 20μs/div



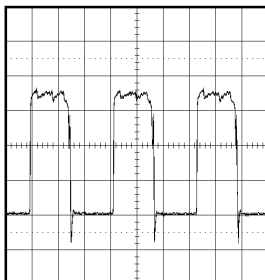
⑧ 20V 20μs/div



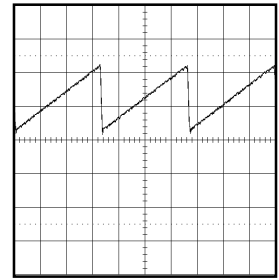
⑬ 1V 20μs/div



④ 200mV 5ms/div

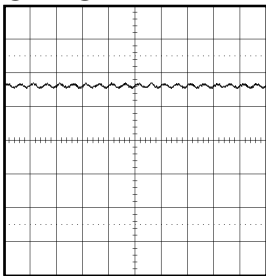


⑨ 200mV 20μs/div

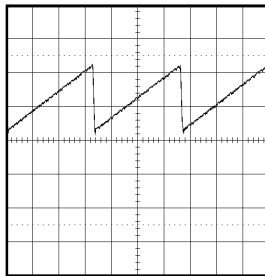


⑭ 0.5V 5ms/div

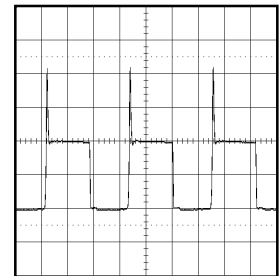
### CHROMA



⑤ 0.5V 2ms/div



⑩ 0.5V 5ms/div

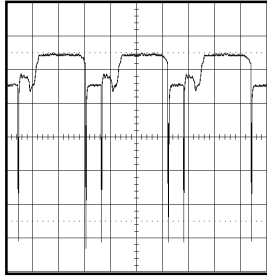


⑮ 20V 20μs/div

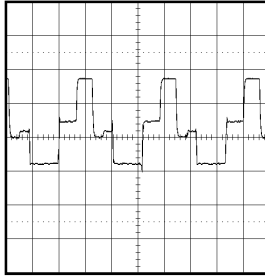
### DEFLECTION/CRT

NOTE: The following waveforms were measured at the point of the corresponding balloon number in the schematic diagram.

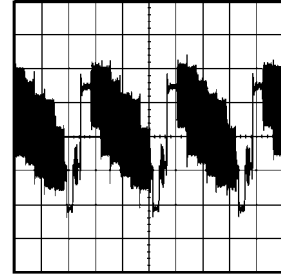
## WAVEFORMS



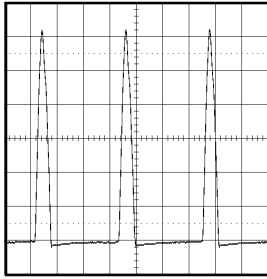
①⑥ 2V 20 $\mu$ s/div



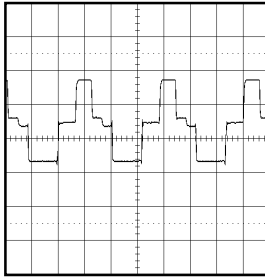
②① 50V 20 $\mu$ s/div



②⑥ 500mV 20 $\mu$ s/div

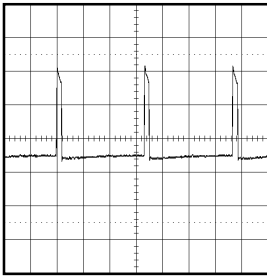


①⑦ 200V 20 $\mu$ s/div

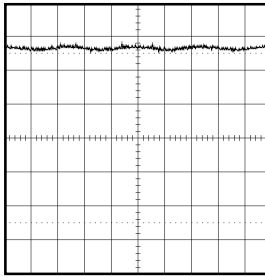


②② 50V 20 $\mu$ s/div

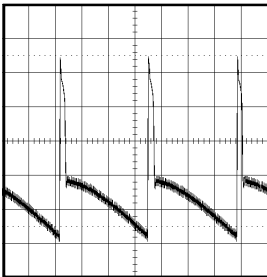
## SOUND/AV



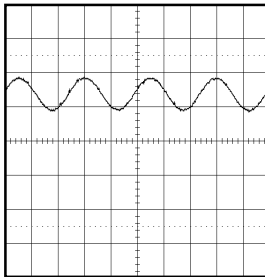
①⑧ 10V 5ms/div



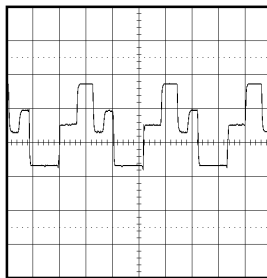
②③ 0.5V 1ms/div



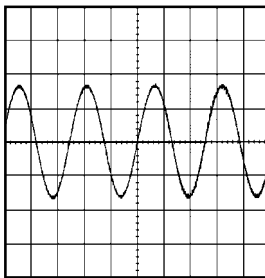
①⑨ 10V 5ms/div



②④ 1V 1ms/div



②⑤ 50V 20 $\mu$ s/div



②⑤ 500mV 1ms/div

NOTE: The following waveforms were measured at the point of the corresponding balloon number in the schematic diagram.

Exploded view diagram of a CRT television showing various components and their assembly points. The diagram includes the CRT tube (V801), yoke (L503), and deflection yoke (J801) assembly, the main PCB (PCB010) with various components like the tuner (TU001), FB401, and various resistors and capacitors, the CRT PCB (PCB110), and the speaker (SP351). The diagram also shows the internal structure of the television cabinet, including the base (101), side panels (110, 113), and the rear panel (104). Various screws (201, 202, 203) and other fasteners are shown. The diagram is divided into three main sections: the top section shows the CRT assembly, the middle section shows the main PCB assembly, and the bottom section shows the cabinet assembly.

# MECHANICAL REPLACEMENT PARTS LIST

Location No.	TSB P/N	Reference No.	Description	
101	AD300891	A3J911A720	CABINET,FRONT ASSY	
102	BZ710009	741WUA0019	SPRING,EARTH	
103	AD300695	713WPAA051	GLASS,LED	
104	AD300892	A3J911A740	CABINET,BACK ASSY	
105	AD300693	701WPJB223	CABINET,FRONT	
106	AD300694	713WPAA050	GUIDE,REMOCON	
107	AD300696	735WPBA247	BUTTON,FRAME	
108	BZ710260	899HV3T000	HOLDER,ANODE WIRE	
109	AD300842	702WPAA176	CABINET,BACK	
110	AD300893	722549A034	SHEET,RATING	
111	AD300843	800WQ00044	FELT SHEET	
112	AD300007	7230006755	SHEET,CAUTION	
113	AD300844	800WQ00038	FELT SHEET	
114	BZ710321	8121F50B84	SCREW,TAPPING(B0) GW20 FLAT	5x28
201	BZ710019	8109630802	SCREW,TAP TITE(B) BRAZIER	3x8
202	BZ710035	8117540A64	SCREW,TAPPING(B0) TRUSS	4x16
203	BZ710239	8109I30A04	SCREW,TAP TITE(B) WH7	3x10
---	AD300700	792WHAA054	PACKAGE, TOP	
---	AD300701	792WHAA055	PACKAGE,BOTTOM	
---	AD300894	793WCDB041	GIFT BOX	
---	AD300895	A3J911A975	INSTRUCTION BOOK KIT	
---	AD300896	J3J91101	INSTRUCTION BOOK	
---	AD300897	J3J91102	GUARANTEE CARD	

# ELECTRICAL REPLACEMENT PARTS LIST

Location No.	TSB P/N	Reference No.	Description
<b>RESISTORS</b>			
△R401	BZ210013	R4X5T4104F	100K OHM 1/4W
△R405	BZ210023	R4X5T4183F	18K OHM 1/4W
△R406	AD300655	R903N8222J	2.2K OHM 1/8W
△R407	BZ210052	R002T21R8J	1.8 OHM 1/2W
△R408	BZ210092	R4X5T6103F	10K OHM 1/6W
△R409	BZ210114	R4X5T6123F	12K OHM 1/6W
△R426	AD300651	R002T4272J	2.7K OHM 1/4W
△R429	BZ210046	R6558A1R8J	1.8 OHM 2W
△R500	BZ210080	R0G3K2275K	2.7M OHM 1/2W
△R501	AD300652	R5X2CD3R3J	3.3 OHM 5W
△R504	AD300653	R3X28B180J	18 OHM 3W
△R505	AD300654	R3X181152J	1.5K OHM 1W
△R509	AD300655	R903N8222J	2.2K OHM 1/8W
△R515	AD300656	R002T2683J	68K OHM 1/2W
R516	BZ210095	R001T6102J	1K OHM 1/6W
△R517	AD300885	R3K28A4R7J	4.7 OHM 2W
△R518	BZ210084	R4X5T4272F	2.7K OHM 1/4W
△R519	AD300658	R903N8122J	1.2K OHM 1/8W
R524	BZ210010	R3X28B1R2J	1.2 OHM 3W
△R542	AD300659	R3X181R47J	0.47 OHM 1W
△R629	AD300660	R3X28B330J	33 OHM 3W
△R641	BZ210089	R4X5T6273F	27K OHM 1/6W
△R803	BZ210050	R3X18A123J	12K OHM 2W
△R805	BZ210050	R3X18A123J	12K OHM 2W
△R807	BZ210050	R3X18A123J	12K OHM 2W
<b>CAPACITORS</b>			
△C403	BZ110149	E02LT4471M	470 UF 35V
△C414	AD300662	E02LT4101M	100 UF 35V
△C418	BZ110041	E02LT3471M	470 UF 25V
△C434	AD300064	E02LT8220M	22 UF 100V
C437	AD300663	P4J7F3334J	0.33 UF 250V PMS
C442	AD300077	C0JLYR713K	0.001 UF 2KV YR
△C443	BZ110087	P414F9682H	0.0068UF 1.6KV ECWH
△C446	BZ110157	E02LT5220M	22 UF 50V
C448	AD300664	E5EZTC220M	22 UF 200V
△C502	BZ110080	C0J0B0513K	0.001 UF 500V B
△C503	BZ110080	C0J0B0513K	0.001 UF 500V B
△C505	BZ110145	P2472B104M	0.1 UF 275V PHE840
△C506	AD300665	CB3LE0MQ3M	0.0047UF 250V
△C511	AD300666	E50HU5220M	22 UF 50 V
C514	BZ110122	C0JLYR7U2K	680 PF 2KV YR
△C515	AD300925	E02LT2102M	1000 UF 16V
C517	BZ110125	C0JLYR7Q2K	470 PF 2KV YR
△C519	BZ110081	E02LT2471M	470 UF 16V
△C521	AD300060	E62NFB101M	100 UF 160V
△C526	AD300607	E51CGC331M	330 UF 200V
C819	AD300078	C0JBB0713K	0.001 UF 2KV B
<b>DIODES</b>			
D001	AD300072	D94TA30013	DIODE,ZENER
D109	BZ410054	0021721150	LED
△D401	BZ410018	D94TA27011	DIODE,ZENER
△D402	AD300668	D94TA11B11	DIODE,ZENER
D403	BZ410043	D2WT011E10	DIODE,SILICON
D404	BZ410066	D97U06R21B	DIODE,ZENER
△D405	BZ410063	D2WTAU02A0	DIODE,SILICON
D406	BZ410006	D1VT001330	DIODE,SILICON
D408	BZ410043	D2WT011E10	DIODE,SILICON
△D410	BZ410063	D2WTAU02A0	DIODE,SILICON
△D411	BZ410063	D2WTAU02A0	DIODE,SILICON
D412	BZ410019	D97U03001B	DIODE,ZENER
D413	BZ410019	D97U03001B	DIODE,ZENER
△D501	BZ410085	D2WYN40050	DIODE,SILICON
△D502	BZ410085	D2WYN40050	DIODE,SILICON
△D503	BZ410085	D2WYN40050	DIODE,SILICON
△D504	BZ410085	D2WYN40050	DIODE,SILICON
△D505	BZ410076	D2WXB290S0	DIODE,SILICON
D506	AD300671	D97U01801B	DIODE,ZENER
D507	AD300670	D97U01501B	DIODE,ZENER
D508	BZ410006	D1VT001330	DIODE,SILICON
△D509	AD300671	D97U01801B	DIODE,ZENER
△D510	BZ410080	D2WXRU2AM0	DIODE,SILICON
D512	BZ410006	D1VT001330	DIODE,SILICON
△D513	BZ410076	D2WXB290S0	DIODE,SILICON
D514	BZ410006	D1VT001330	DIODE,SILICON
△D515	BZ410085	D2WYN40050	DIODE,SILICON
D516	BZ410006	D1VT001330	DIODE,SILICON
D518	BZ410006	D1VT001330	DIODE,SILICON

# ELECTRICAL REPLACEMENT PARTS LIST

Location No.	TSB P/N	Reference No.	Description
<b>DIODES</b>			
D519	BZ410006	D1VT001330	DIODE,SILICON
△D520	BZ410085	D2WXN40050	DIODE,SILICON
△D521	BZ410085	D2WXN40050	DIODE,SILICON
△D522	BZ410085	D2WXN40050	DIODE,SILICON
D528	BZ410021	D97U05R61B	DIODE,ZENER
D601	BZ410006	D1VT001330	DIODE,SILICON
D602	BZ410058	D97U08R21B	DIODE,ZENER
D605	BZ410043	D2WT011E10	DIODE,SILICON
D610	AD300070	D97U01201B	DIODE,ZENER
D611	AD300070	D97U01201B	DIODE,ZENER
D612	AD300070	D97U01201B	DIODE,ZENER
D613	BZ410006	D1VT001330	DIODE,SILICON
D615	BZ410006	D1VT001330	DIODE,SILICON
D616	BZ410006	D1VT001330	DIODE,SILICON
<b>ICS</b>			
IC101	AD300672	I56F07063A	IC
IC199	AD300886	A3J911A015	IC
△IC351	BZ611001	I01DP75110	IC
△IC401	BZ611053	I01TD55220	IC
IC601	BZ611055	I06FC61206	IC
<b>TRANSISTORS</b>			
△Q401	BZ510036	TD30026270	TRANSISTOR,SILICON
△Q402	AD300674	TCAT032070	TRANSISTOR,SILICON
△Q501	AD300675	T25FK26620	TRANSISTOR,FIELD EFFECT
△Q502	BZ510070	TCAT032034	TRANSISTOR,SILICON
Q503	BZ510004	TA3T016240	TRANSISTOR,SILICON
△Q504	BZ410088	0002E00610	PHOTO COUPLER
Q507	BZ510069	TCATC31980	TRANSISTOR,SILICON
Q603	BZ510070	TCAT032034	TRANSISTOR,SILICON
Q604	BZ510070	TCAT032034	TRANSISTOR,SILICON
Q605	BZ510070	TCAT032034	TRANSISTOR,SILICON
Q606	BZ510070	TCAT032034	TRANSISTOR,SILICON
Q607	BZ510023	TNYTB03001	COMPOUND TRANSISTOR
Q801	BZ510009	TC3F042170	TRANSISTOR,SILICON
Q802	BZ510009	TC3F042170	TRANSISTOR,SILICON
Q803	BZ510009	TC3F042170	TRANSISTOR,SILICON
<b>COILS &amp; TRANSFORMERS</b>			
L101	AD300676	021LA63R3K	COIL
△L501	AD300677	029T00A7M1	COIL,LINE FILTER
△L503	BZ310092	028R200029	COIL,DEGAUSS
L601	AD300678	0216731R2K	COIL
L606	BZ310009	021LA62R2K	COIL
L607	BZ310043	021LA6150K	COIL
L801	BZ310041	02167F101J	COIL
T401	BZ310025	03305Y002S	TRANS,HORIZONTAL DRIVE
△T502	AD300679	0481290184	TRANSFORMER,SWITCHING
<b>JACKS</b>			
J702	AD300680	060Q401077	RCA JACK
J703	AD300681	060Q401076	RCA JACK
△J801	BZ614057	066C130015	SOCKET,CATHODE RAY TUBE
<b>SWITCHES</b>			
SW101	BZ612001	0504201T31	SWITCH,TACT
SW102	BZ612001	0504201T31	SWITCH,TACT
SW103	BZ612001	0504201T31	SWITCH,TACT
SW104	BZ612001	0504201T31	SWITCH,TACT
SW105	BZ612001	0504201T31	SWITCH,TACT
<b>P.C.BOARD ASSEMBLIES</b>			
PCB010	AD300887	A3J911A010	PCB ASS'Y
PCB110	AD300888	A3J911A110	PCB ASS'Y
<b>MISCELLANEOUS</b>			
CD351	AD300684	06CH122301	CORD CONNECTOR
△CD501	AD300685	120R414903	CORD AC BUSH
CD801	BZ614175	06CU82039A	CORD CONNECTOR
CF601	AD300621	1022T45R73	FILTER,SAW
CF603	BZ613015	1011T4R504	FILTER,CERAMIC
CF604	AD300686	1012T4R519	FILTER,CERAMIC TRAP
△CP401	BZ614020	069X450029	CONNECTOR PCB SIDE
△CP502	AD300687	069S420110	CONNECTOR PCB SIDE
CP601	BZ614135	0694260139	CONNECTOR PCB SIDE
CP801	BZ614269	069S320010	CONNECTOR PCB SIDE
CP802A	BZ614273	067U010049	WIRE HOLDER
CP802B	BZ614273	067U010049	WIRE HOLDER
EL001	BZ614043	124116281A	EYE LET
EL002	BZ614044	124120301A	EYE LET
△F501	AD300688	081PC04004	FUSE
△FB401	BZ310097	043219011F	TRANSFORMER,FLYBACK
FH501	BZ614005	06710T0006	HOLDER,FUSE

# ELECTRICAL REPLACEMENT PARTS LIST

Location No.	TSB P/N	Reference No.	Description
<b>MISCELLANEOUS</b>			
FH502	BZ614005	06710T0006	HOLDER,FUSE
OS101	BZ614171	077Q014003	REMOTE RECEIVER
S101	AD300889	WHL6032038	FLAT CABLE AWM2468 A
△SP351	AD300689	070Y132018	SPEAKER
△TH501	BZ410079	DF5EL3R0A0	DEGAUSS ELEMENT
TM101	AD300690	076N0EH010	TRANSMITTER
△TU001	AD300691	0145S00052	TUNER,VHF-UHF
△V801	AD300890	098Q200489	CRT W/DY
X101	AD300624	1001T8R004	CERAMIC,OSCILLATOR
X602	BZ613004	100CT3R505	CRYSTAL
RESISTOR			
	RC.....	CARBON RESISTOR	
CAPACITORS			
	CC.....	CERAMIC CAPACITOR	
	CE.....	ALUMI ELECTROLYTIC CAPACITOR	
	CP.....	POLYESTER CAPACITOR	
	CPP.....	POLYPROPYLENE CAPACITOR	
	CPL.....	PLASTIC CAPACITOR	
	CMP.....	METAL POLYESTER CAPACITOR	
	CMPL.....	METAL PLASTIC CAPACITOR	
	CMPP.....	METAL POLYPROPYLENE CAPACITOR	

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HEAD OFFICE / 327 KAMAEE STREET, HONOLULU, HAWAII 96814 U.S.A.